

# ULTRA-SHALLOW METAL OXIDE SURFACE CHANNEL MOS TRANSISTOR

## ABSTRACT OF THE INVENTION

5           An ultra-shallow surface channel MOS transistor and  
method for fabricating the same have been provided. The method  
comprises: forming CMOS source and drain regions, and an intervening  
well region; depositing a surface channel on the surface overlying the well  
region; forming a high-k dielectric overlying the surface channel; and,  
10   forming a gate electrode overlying the high-k dielectric. Typically, the  
surface channel is a metal oxide, and may be one of the following  
materials: indium oxide ( $\text{In}_2\text{O}_3$ ), ZnO, RuO, ITO, or  $\text{LaX-1SrXCoO}_3$ . In  
some aspects, the method further comprises: depositing a placeholder  
material overlying the surface channel; and, etching the placeholder  
15   material to form a gate region overlying the surface channel. In one  
aspect, the high-k dielectric is deposited prior to the deposition of the  
placeholder material. Alternately, the high-k dielectric is deposited  
following the etching of the placeholder material.